

Sandia Large Rotor Design Scorecard (SNL100-00)

Example completed for SNL100-00. Reference: D.T. Griffith and T.D. Ashwill, "The Sandia 100-meter All-glass Baseline Wind Turbine Blade: SNL100-00," Sandia National Laboratories Technical Report, SAND2011-3779.

Table 1: Blade Parameters

Parameter	Value
Blade Designation	SNL100-00
Wind Speed Class	IB
Blade Length (m)	100
Blade Weight (kg)	114,172
Span-wise CG location (m)	33.6
# shear webs	3
Maximum chord (m)	7.628 (19.5% span)
Lowest fixed base natural frequency (Hz)	0.42
Control	Variable speed; collective pitch
Special notes:	6% (weight) parasitic resin; all-glass materials

Table 2. Blade Design Performance Metrics Summary

Analysis	Design Load Condition (DLC) designation	Metrics	Notes/method
Fatigue	Turbulent inflow (4 to 24 m/s)	Critical location: Inboard (edge-wise): 1290yrs at 11.1% span	R=0.1 data used; Miners Rule
Ultimate	EWM50; 0 deg pitch	Max strain = 2662 micro-strain Allowable strain = 5139 micro-strain Max/allowable = 48.2%	At max chord (flapwise) FAST, NuMAD/ANSYS
Tip Deflection	ECD-R	Max (11.9 m) vs. allowable (13.67); Clearance = 1.77m = 12.9%	FAST, NuMAD/ANSYS
Buckling	EWM50, 0 deg pitch	Min load factor (2.173) vs. allowable (2.042)	Linear, ANSYS
Flutter	--	Flutter margin (1-1.1)	Beam theory (see SAND2011-3779)

Table 3. Blade Design Bill of Materials

Material performance properties are provided in SNL100-00 Report (SAND2011-3779)

Material	Description	Mass (kg)	Percent Blade Mass
E-LT-5500	Uni-axial Fiberglass	37,647	32.5%
Saertex	Double Bias Fiberglass	10,045	8.7%
EP-3	Resin	51,718	44.7%
Foam	Foam	15,333	13.3%
Gelcoat	Coating	920	0.8%